

Program: Basic Energy Sciences

Agency: Department of Energy

Bureau: Office of Science

Rating: Effective

Program Type: Research and Development, Competitive Grant, Capital Assets and Service Acquisition

Last Assessed: 1 year ago

Key Performance Measures from Latest PART	Year	Target	Actual
Long-term Measure: Progress in designing, modeling, fabricating, characterizing, analyzing, assembling, and using a variety of new materials and structures, including metals, alloys, ceramics, polymers, biomaterials and more--particularly at the nanoscale--for energy-related applications. An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.	2006	Excellent	
	2009	Excellent	
	2012	Excellent	
	2015	Excellent	
Annual Efficiency Measure: Average achieved operation time of the scientific user facilities as a percentage of the total scheduled annual operation time.	2003	>90%	91%
	2004	>90%	92%
	2005	>90%	
	2006	>90%	
Annual Measure: Improve Spatial Resolution: Demonstrated spatial resolutions for imaging in the hard and soft x-ray regions, and spatial information limit for an electron microscope (measured in nanometers).	2003		130, 20, 0.09
	2004	<115,<19, <0.08	100, 19, 0.08
	2005	<100,<18, <0.08	
	2006	<100,<18, <0.08	

Recommended Follow-up Actions	Status
The Department will continue to improve performance reporting and centralize management and planning of operations at its user facilities.	Action taken, but not completed
The Department will work to include the long-term goals of each program in grant solicitations, and will improve performance reporting by grantees and contractors.	Action taken, but not completed
The Department will work with its advisory committee to develop research milestones [by September, 2004] against which future outside panels may judge interim progress toward achieving the long-term goals of the program.	Action taken, but not completed

Update on Follow-up Actions:

(1) BES has responded to the DOE IG report on performance report at two of its light sources, and is in the process of centralizing the management, planning, and condition and utilization metric reporting for the beamlines at its user facilities. (2) Long-term goals are now included in grant solicitations, but performance reporting at the grantee/contractor level for the entire Office of Science is not yet transparent and readily accessible. (3) The program's research milestones--as expressed in the new DOE program plans--were produced and reflect the strategic goals of the program, but the BES advisory committee has yet to formally comment on the milestones.

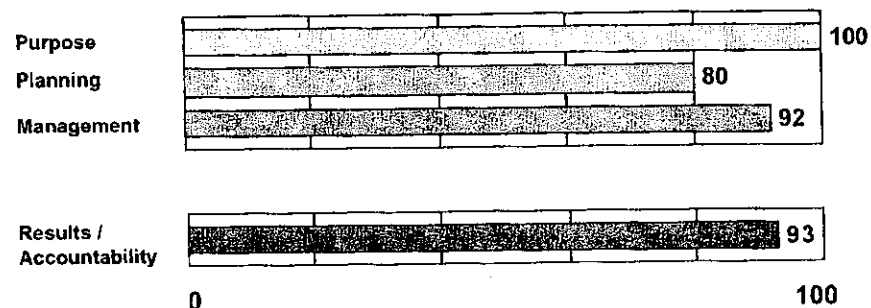
Program Funding Level (in millions of dollars)

2004 Actual	2005 Estimate	2006 Estimate
1,011	1,105	1,146

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Key Performance Measures

Year Target Actual

Long-term Measure: Progress in designing, modeling, fabricating, characterizing, analyzing, assembling, and using a variety of new materials and structures, including metals, alloys, ceramics, polymers, biomaterials and more—particularly at the nanoscale—for energy-related applications. An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.	2006	Excellent	
	2009	Excellent	
	2012	Excellent	
	2015	Excellent	
Annual Efficiency Measure: Average achieved operation time of the scientific user facilities as a percentage of the total scheduled annual operation time. (Scheduled annual operating time is roughly 31,350 hours in 2004 and 35,450 hours in 2005. The ambitiousness and appropriateness of the 90% target level is currently under review by OMB.)	2002	>90%	96%
	2003	>90%	91%
	2004	>90%	
	2005	>90%	
Annual Measure: Improve Spatial Resolution: Demonstrated spatial resolutions for imaging in the hard and soft x-ray regions, and spatial information limit for an electron microscope (measured in nanometers).	2002		150, 24, 0.09
	2003		130, 20, 0.09
	2004	<115, <19, <0.08	
	2005	<100, <18, <0.08	

Rating: Effective

Program Type: Research and Development, Competitive Grant, Capital Assets and Service Acquisition

Program Summary:

The Office of Science's Basic Energy Sciences (BES) program funds research in materials sciences, chemistry, geosciences, and aspects of biosciences, and provides national user facilities for over 8,000 researchers annually who are funded by DOE, other federal research agencies, foreign institutions, and the private sector.

The assessment found that the BES program has developed a limited number of adequate performance measures, as recommended during the 2004 PART process. Additional findings include:

- The program is strategically driven and well managed.
- Outside expert panels have validated the program's merit-based review processes for awarding contracts and grants, resulting in a sponsored research portfolio that is generally considered to be relevant and of very high quality.
- The experimental end stations at one the program's main facilities have been underutilized at times, and there was a general lack of performance reporting on the actual use of all of the program's synchrotron light source facilities.
- The program does not include its long term research goals in grant solicitations, does not use strict quality control on performance data filed by laboratory contractors, and does not make annual aggregated grantee performance data available to the public in a transparent and meaningful manner.

In response to these findings:

1. The 2005 Budget provides funding to operate the program's main user facilities at 100 percent of maximum capacity (the same as in 2004). Funds are provided to start construction on the final nanoscale science research center and for procurement activities for a new x-ray laser light source. The Budget nearly quadruples BES basic research funding for critical hydrogen and fuel cell work in support of the President's Hydrogen Initiative.
2. The Department will continue to improve performance reporting and centralize management and planning of operations at its user facilities.
3. The Department will work to include the long-term goals of each program in grant solicitations, and will improve performance reporting by grantees and contractors.
4. The Department will work with its advisory committee to develop research milestones [by September, 2004] against which future outside panels may judge interim progress toward achieving the long-term goals of the program.

Program Funding Level (in millions of dollars)

2003 Actual	2004 Estimate	2005 Estimate
1,020	1,011	1,064

Program Assessment Rating Tool (PART)

Program: Basic Energy Sciences

Agency: Department of Energy

Bureau: Office of Science

Type(s): Research and Development

Competitive Grant

Capital Assets and Service Acquisitio

Section Scores				Overall Rating
1	2	3	4	Effective
100%	80%	92%	93%	

1.1 Is the program purpose clear?

Answer: YES

Question Weight: 20%

Explanation: The mission of the Basic Energy Sciences (BES) program is to foster and support fundamental research to expand the scientific foundations for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. As part of its mission, the BES program plans, constructs, and operates major scientific user facilities.

Evidence: FY04 Budget Request (www.mbe.doe.gov/budget/04budget/index.htm). Public Law 95-91 establishing the Department of Energy (DOE).

1.2 Does the program address a specific and existing problem, interest or need?

Answer: YES

Question Weight: 20%

Explanation: BES supports focused Core Research Activities (CRAs) within the broad areas of materials sciences and engineering, chemical sciences, biosciences, and geosciences. BES also supports major scientific user facilities.

Evidence: The 21 CRAs are described in detail, including the specific needs addressed by each, at: www.sc.doe.gov/bes/CRA.html.

1.3 Is the program designed so that it is not redundant or duplicative of any other Federal, state, local or private effort?

Answer: YES

Question Weight: 20%

Explanation: The CRAs referenced above describe the unique contributions that this program makes to addressing the identified needs. BES is well coordinated with similar programs at the National Science Foundation (NSF) and other basic research Agencies to ensure complementarity and to avoid redundancy.

Evidence: Within the CRA write-ups on the web, specific coordination efforts with other federal agencies are itemized.

1.4 Is the program design free of major flaws that would limit the program's effectiveness or efficiency?

Answer: YES

Question Weight: 20%

Explanation: The BES program is based on competitive merit-review (validated by Committees of Visitors and the General Accounting Office), independent expert advice, and community planning (through the Advisory Committee) This proves efficient and effective.

Evidence: Two Committee of Visitors (COV) reports, Basic Energy Sciences Advisory Committee (BESAC) reviews and reports, and scientific workshop reports (www.sc.doe.gov/production/bes/besac/reports.html). General Accounting Office (GAO) report on BES merit review (www.gao.gov/archive/2000/rc00109.pdf). Program files.

1.5 Is the program effectively targeted, so that resources will reach intended beneficiaries and/or otherwise address the program's purpose directly?

Answer: YES

Question Weight: 20%

Explanation: BESAC ensures that research community input is regularly gathered to assess the priorities, projects, and progress of the program. Peer review is used to assess the relevance and quality of each project. User surveys and facility advisory committees help to prioritize facility research.

Evidence: BESAC reviews and reports (including facility reviews; www.sc.doe.gov/production/bes/besac/reports.html). Program files.

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2.1 Does the program have a limited number of specific long-term performance measures that focus on outcomes and meaningfully reflect the purpose of the program? Answer: YES Question Weight: 10%

Explanation: Four long-term measures focus on scientific or technical outcomes, and are meaningful indicators of progress in key fields relevant to DOE missions, as outlined by numerous advisory committee panels, interagency efforts such as the National Nanotechnology Initiative, and DOE's technology programs. The program has defined "successful" and "minimally effective" performance milestones for each measure, and an external panel will assess interim program performance on a triennial basis, and update the measures as necessary. It is inappropriate for a basic research program such as this one to have a quantitative long-term efficiency measure.

Evidence: Multitude of BESAC reports on the scientific drivers for the fields supported by BES (www.sc.doe.gov/production/bes/besac/reports.html). National Research Council report, "Condensed-Matter and Materials Physics: Basic Research for Tomorrow's Technology" (books.nap.edu/catalog/6407.html). A description of the "successful" and "minimally effective" milestones, and an explanation of the relevance of these measures to the field can be found on the SC Web site (www.sc.doe.gov/measures).

2.2 Does the program have ambitious targets and timeframes for its long-term measures? Answer: YES Question Weight: 10%

Explanation: BESAC has reviewed the new long-term measures for this program and found them to be ambitious and meaningful indicators of progress in key fields. The external reviews described in 2.1 will update the measures, targets, and timeframes on an interim basis.

Evidence: Letter from BESAC chair regarding review of long-term measures.

2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Answer: YES Question Weight: 10%

Explanation: The facilities construction and operations measures, and the resolution measures should provide the capabilities that the scientific community needs to make discoveries directly connected to the long term measures. The quantifiable and trendable resolution measures reflect the key technological drivers to making discoveries at smaller spatial and temporal scales, which is vital to making progress toward the long-term goals of the scientific work supported by BES.

Evidence: FY04 Budget Request. Website with further information, including an explanation of why improved spatial and temporal resolution is important to progress (www.sc.doe.gov/measures).

2.4 Does the program have baselines and ambitious targets for its annual measures? Answer: YES Question Weight: 10%

Explanation: All of the annual measures include quantifiable annual targets. Baseline data (FY02, and FY01 for older measures) and the reports referenced in 2.1 verify that the annual measures are ambitious, yet realistic.

Evidence: FY04 Budget Request. Construction variance target of <10% comes from OMB Circular A-11, especially Capital Programming Guide supplement.

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2.5 Do all partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) commit to and work toward the annual and/or long-term goals of the program?

Answer: NO

Question Weight: 10%

Explanation: A limited FY03 audit by the DOE Inspector General (IG) found that "performance expectations generally flowed down into the scope of work at the national laboratories." For individual grantees, BES relies mainly on general SC program solicitations, which do not explicitly include the program goals. A 2002 DOE IG report found a lack of performance measures to evaluate the use of beam lines at the BES user facilities.

Evidence: Most recent general renewal solicitation (www.science.doe.gov/grants/Fr03-02.html). Memo from the DOE IG to the Director of the Office of Science. M&O contract performance evaluation provisions (WWW-accessible examples include: Oak Ridge National Lab, www.ornl.gov/Contract/UT-BattelleContract.htm; and, Lawrence Berkeley National Lab, www.lbl.gov/LBL-Documents/Contract-98/AppFTOC.html). DOE IG report on light sources at Berkeley and Stanford (www.ig.doe.gov/pdf/ig-0562.pdf).

2.6 Are independent evaluations of sufficient scope and quality conducted on a regular basis or as needed to support program improvements and evaluate effectiveness and relevance to the problem, interest, or need?

Answer: YES

Question Weight: 10%

Explanation: All research projects undergo Merit Review. Grants are reviewed triennially. Construction projects are reviewed quarterly. BESAC periodically reviews BES research and facilities, including the institution of a Committees of Visitors (COV) process to independently evaluate the quality of the BES research portfolio and organizational procedures. COVs will systematically evaluate all BES Core Research Activities on a 3-year cycle.

Evidence: SC Merit Review guidelines (www.sc.doe.gov/production/grants/merit.html). COV reports #1 ("Chemistry" Division, 2002) and #2 ("Materials" Division, 2003), and multiple BESAC facility reviews (www.sc.doe.gov/bes/BESAC/reports.html). BES actions in response to the recommendations of COV #1 (www.sc.doe.gov/bes/besac/BESAC%20Pat%207-22-02.ppt, slides 14-15). Program files, including Lehman review reports on construction projects.

2.7 Are Budget requests explicitly tied to accomplishment of the annual and long-term performance goals, and are the resource needs presented in a complete and transparent manner in the program's budget?

Answer: NO

Question Weight: 10%

Explanation: DOE has not yet provided a budget request that adequately integrates performance information.

Evidence:

2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies?

Answer: YES

Question Weight: 10%

Explanation: New performance goals and targets have been developed in coordination with OMB. BES participated in the drafting of a new SC strategic plan. Several recent BESAC-related workshop studies examine potential future programmatic emphases for BES.

Evidence: FY04 Budget Request/Annual Performance Plan. SC strategic plan has yet to be officially provided to OMB for review. BESAC workshops on catalysis, assuring a secure energy future, and basic research for the hydrogen initiative (www.sc.doe.gov/bes/BESAC/reports.html).

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2.CA1 Has the agency/program conducted a recent, meaningful, credible analysis of alternatives that includes trade-offs between cost, schedule, risk, and performance goals and used the results to guide the resulting activity?

Answer: YES

Question Weight: 10%

Explanation: One of a kind research facilities are not amenable to the same type of alternatives analysis as other captial asset investments. Nevertheless, the captial asset plans and business case documentation in the Exhibit 300s provided to OMB contain roughly equivalent analyses. Lehman reviews make recommendations concerning new and ongoing projects based on various cost, schedule, and risk assessments, and the program and/or project make changes accordingly. BESAC facility reviews recommended actions that involve trade-offs between upgrading a facility or building a new facility, but these are not reviews of the program's analyses.

Evidence: BESAC facility reports (www.sc.doe.gov/bes/BESAC/reports.html). Program files, including Lehman reports of ongoing projects such as the Spallation Neutron Source.

2.RD1 If applicable, does the program assess and compare the potential benefits of efforts within the program to other efforts that have similar goals?

Answer: NA

Question Weight: 0%

Explanation: This is a basic R&D program, and the question is intended for industry-related R&D programs.

Evidence:

2.RD2 Does the program use a prioritization process to guide budget requests and funding decisions?

Answer: YES

Question Weight: 10%

Explanation: A BESAC 20-year facilities roadmap exercise, with clear priority recommendations, was conducted in conjunction with the SC strategic planning process. BES does not conduct similar roadmap exercises for the base research program within the context of the facilities.

Evidence: BESAC 20-year facilities roadmap report (www.sc.doe.gov/bes/BESAC/20year_facilities_report.pdf).

3.1 Does the agency regularly collect timely and credible performance information, including information from key program partners, and use it to manage the program and improve performance?

Answer: YES

Question Weight: 8%

Explanation: Lehman reviews provided performance information for facility construction projects, and panel peer reviews evaluate the performance of facility operations. The program collects performance data from individual grantees and national labs, and uses peer review as a type of standardized quality control. A recent GAO report validated the BES merit review processes. Thorough research portfolio quality and process validations are carried out by Committee of Visitors on a 3-year cycle, and management changes are made in response to these COV reports. While DOE IG contracts with an outside auditor to check internal controls for performance reporting, and the IG periodically conducts limited reviews of performance measurement in SC, it is not clear that these audits check the credibility of performance data reported by DOE contractors.

Evidence: Program files, including Lehman reviews. BESAC facility reports (www.sc.doe.gov/bes/BESAC/reports.html). BES actions taken in response to the recommendations of COV #1 (www.sc.doe.gov/bes/besac/BESAC%20Pat%207-22-02.ppt, slides 14-15). Response to COV #2 will occur at next BESAC meeting, and process changes will be implemented starting with FY 2004 execution. GAO report on BES merit review (www.gao.gov/archive/2000/rc00109.pdf).

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3.2 Are Federal managers and program partners (including grantees, sub-grantees, contractors, cost-sharing partners, and other government partners) held accountable for cost, schedule and performance results?

Answer: YES

Question Weight: 8%

Explanation: Senior Executive Service (SES) and Program Manager Performance Plans are directly linked to program goals. The Management and Operations (M&O) contracts for the Labs and User Facilities include performance measures linked to program goals. Actions are taken in response to findings in reviews of lab Field Work Proposal performance. Management changes were made in response to problems at the High Flux Isotope Reactor operations and Spallation Neutron Source construction at Oak Ridge National Lab. Changes were made to the Berkeley Lab's Advanced Light Source organizational structure and user program in response to a 1997 BESAC review. Research funding requirements ensure consideration of past performance.

Evidence: Program and personnel files. For performance-based fee adjustments on M&O contracts, see evidence for question 2.5. Grant rules for renewals (www.science.doe.gov/grants/#GrantRules). Briefing to OMB on problems, and subsequent management changes, at the High Flux Isotope Reactor and Spallation Neutron Source. 2000 BESAC assessment of response to 1997 review citing user concerns at the Advanced Light Source (ALS; www.sc.doe.gov/bes/BESAC/als%20report.pdf).

3.3 Are funds (Federal and partners') obligated in a timely manner and spent for the intended purpose?

Answer: YES

Question Weight: 8%

Explanation: Using DOE's monthly accounting reports, SC personnel monitor progress toward obligating funds consistent with an annual plan that is prepared at the beginning of the fiscal year to ensure alignment with appropriated purposes.

Evidence: SC programs consistently obligate more than 99.5% of available funds. Program files. Audit reports.

3.4 Does the program have procedures (e.g. competitive sourcing/cost comparisons, IT improvements, appropriate incentives) to measure and achieve efficiencies and cost effectiveness in program execution?

Answer: YES

Question Weight: 8%

Explanation: SC is currently undergoing a reengineering exercise aimed at flattening organizational structure and improving program effectiveness. BES was restructured in FY02 to flatten the organizational structure and improve efficiencies. The program collects the data necessary to track their two "efficiency" measures for facility construction and operation management.

Evidence: SC reengineering information (www.screstruct.doe.gov). "Efficiency" measure data in FY04 Budget Request (www.mbe.doe.gov/budget/04budget/index.htm).

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3.5 Does the program collaborate and coordinate effectively with related programs?

Answer: YES

Question Weight: 8%

Explanation: The BES program is well coordinated with similar programs at the National Science Foundation and other agencies that support similar basic research to ensure complementarity and to avoid redundancy. BES is fairly well integrated with other relevant SC programs, and to a lesser degree with the energy technology programs at DOE. Partnerships with other agencies are rare, but typically important when they occur.

Evidence: A recent update by the Interagency Working Group on Neutron Science reported good progress on the DOE-NSF partnership for developing an instrument suite for the Spallation Neutron Source. The SPEAR 3 upgrade at the Stanford Synchrotron Radiation Lab (SSRL) was jointly and equally funded by BES and the National Institutes of Health (BES budget requests from FY04 and earlier). Some joint sponsorship of National Research Council studies.

3.6 Does the program use strong financial management practices?

Answer: YES

Question Weight: 8%

Explanation: SC staff execute the BES program consistent with established DOE budget and accounting policies and practices. These policies have been reviewed by external groups and modified as required to reflect the latest government standards.

Evidence: Various Departmental manuals. Program files. Audit reports.

3.7 Has the program taken meaningful steps to address its management deficiencies?

Answer: YES

Question Weight: 8%

Explanation: SC is currently reengineering to improve program management efficiency. BES has worked with OMB to improve performance evaluation. BES management was "responsive" to DOE IG report recommendations on beamline-level problems at the ALS. Changes to merit review processes were made after the first COV report, and a few more are expected in response to the second COV report.

Evidence: SC reengineering information (www.screstruct.doe.gov). BES actions in response to the recommendations of the first COV ("Chemistry" division; www.sc.doe.gov/bes/besac/BESAC%20Pat%207-22-02.ppt, slides 14-15). DOE IG report on the synchrotron sources at LBNL and SLAC (www.ig.doe.gov/pdf/ig-0562.pdf).

3.CA1 Is the program managed by maintaining clearly defined deliverables, capability/performance characteristics, and appropriate, credible cost and schedule goals?

Answer: YES

Question Weight: 8%

Explanation: The BES program documents the capabilities and characteristics of new facilities in conceptual design reports that are reviewed by BESAC and an independent Lehman Reviews. Progress is tracked quarterly through program and Lehman reviews, and reported annually in predecisional and budget request documents.

Evidence: Program files, including Lehman reports. Predecisional Exhibit 300s submitted to OMB. Construction project data sheets in budget requests (www.mbe.doe.gov/budget/04budget/index.htm).

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3.CO1	Are grants awarded based on a clear competitive process that includes a qualified assessment of merit?	Answer: YES	Question Weight: 8%
Explanation:	First time grant applications are encouraged in all Request For Proposals. BES conducts outreach to under-represented groups including Historically Black College and Universities, Hispanic Serving College and Universities, and women researchers. Merit review guides all funding decisions, and the process has been validated by GAO and COV reviews. Since federal regulations prohibit lab proposals from directly competing with university proposals, the process is technically defined as one of "limited competition" according to OMB Circular A-11. The first ("Chemistry") COV report found a couple small areas that had low turnover.		
Evidence:	On average, the BES turnover rate is 10%. If there are new initiatives, such as the nanoscience initiative, the number of new awards is much larger. "How to Apply" (www.science.doe.gov/production/grants/guide.html). GAO (www.gao.gov/archive/2000/rc00109.pdf) and COV reviews (www.sc.doe.gov/bes/BESAC/reports.html).		
3.CO2	Does the program have oversight practices that provide sufficient knowledge of grantee activities?	Answer: YES	Question Weight: 8%
Explanation:	In addition to grantee progress reports, program managers stay in contact with grantees through email and telephone, conduct program reviews and site visits.		
Evidence:	Program files, including site visit logs.		
3.CO3	Does the program collect grantee performance data on an annual basis and make it available to the public in a transparent and meaningful manner?	Answer: NO	Question Weight: 8%
Explanation:	In accordance with DOE Order 241.1A, the final and annual technical reports of program grantees are made publicly available on the web through the Office of Scientific and Technical Information's "Information Bridge". However, program-level aggregate data on the impact of the grants program is not adequately communicated in the annual DOE Performance and Accountability report.		
Evidence:	DOE Order 241.1A. Information Bridge (www.osti.gov/bridge/). FY02 Performance and Accountability Report (www.mbe.doe.gov/stratmgt/doe02rpt.pdf).		
3.RD1	For R&D programs other than competitive grants programs, does the program allocate funds and use management processes that maintain program quality?	Answer: YES	Question Weight: 8%
Explanation:	The funds for research programs and scientific user facilities at the Federal Labs are allocated through a limited competition analogous process to the unlimited process outlined in 10 CFR 605. A GAO report and the two COV reports validate both the BES merit review process, with the latter reports finding a generally high quality research portfolio, without separating university and lab work.		
Evidence:	SC Merit Review procedures (www.sc.doe.gov/production/grants/merit.html). 10 CFR 605 (www.science.doe.gov/production/grants/605index.html). BES Merit Review Procedures for Projects at DOE Labs (www.sc.doe.gov/bes/peerreview.html). GAO report on BES merit review (www.gao.gov/archive/2000/rc00109.pdf). BESAC and COV review reports (www.sc.doe.gov/bes/BESAC/reports.html). Program files.		

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4.1 Has the program demonstrated adequate progress in achieving its long-term performance goals? Answer: LARGE EXTENT Question Weight: 20%

Explanation: Future COVs will evaluate progress toward the new long term performance measures every three years, but no external reviews that address progress toward program goals (either past ones or the new ones proposed in the "measures" tab) are available to date other than the generally positive reviews by BESAC and the two COVs.

Evidence: BESAC & COV reports (www.sc.doe.gov/bes/BESAC/reports.html).

4.2 Does the program (including program partners) achieve its annual performance goals? Answer: YES Question Weight: 20%

Explanation: Although three of the annual performance measures for FY05 are new, BES has met the targets for all of its former annual GPRA measures.

Evidence: FY02 Performance and Accountability Report (www.mbe.doe.gov/stratmgt/doe02rpt.pdf). FY04 Annual Performance Plan (www.mbe.doe.gov/budget/04budget/content/perfplan/perfplan.pdf).

4.3 Does the program demonstrate improved efficiencies or cost effectiveness in achieving program goals each year? Answer: YES Question Weight: 20%

Explanation: The recent history of tracking the two "efficiency" measures for facility construction and operation management shows that, on average, the program continues to meet or exceed expectations. The most significant deviation being the 1999/2000 baseline change for the Spallation Neutron Source (SNS) project.

Evidence: Program files, including facilities usage data. Predecisional Exhibit 300s submitted to OMB. Construction project data sheets in budget requests (www.mbe.doe.gov/budget/04budget/index.htm).

4.4 Does the performance of this program compare favorably to other programs, including government, private, etc., with similar purpose and goals? Answer: NA Question Weight: 0%

Explanation: While the recent COV reports commented favorably upon the world-class nature of individual areas of the BES research portfolio, no other program with the range of activities and mission focus exists in the world. The National Academies recently conducted an international benchmarking study for U.S. materials science and engineering, but such studies are not able to parse accomplishments by funding agency, which dramatically reduces the value of such a comparison at the program level of the PART.

Evidence: COV reports (www.sc.doe.gov/bes/BESAC/reports.html). National Academies benchmarking study (www.nap.edu/catalog/9784.html).

4.5 Do independent evaluations of sufficient scope and quality indicate that the program is effective and achieving results? Answer: YES Question Weight: 20%

Explanation: Numerous BESAC reviews (and to some extent the COV reviews) have demonstrated that the BES program is effective and achieving results, though the program rarely seeks additional independent advice outside BESAC or workshops. DOE IG report on SSRL and the ALS found that the ALS beamlines were not being fully utilized.

Evidence: BESAC and COV review reports (www.sc.doe.gov/bes/BESAC/reports.html). DOE IG report on the synchrotron sources at LBNL and SLAC (www.ig.doe.gov/pdf/ig-0562.pdf).

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1	2	3	4	Effective
100%	80%	92%	93%	

4.CA1 **Were program goals achieved within budgeted costs and established schedules?** Answer: YES Question Weight: 20%

Explanation: BES upgrade and construction project baselines were met for FY02. BES disagreed with a DOE IG report that found a reduction of scope in the SNS project was used to keep the project within cost. A 2002 National Research Council assessment of project management at DOE concluded that SC continues to "consider project scope as a contingency" as part of a "design-to-budget approach." Since the SNS is scientific research tool, a good argument can be made that the original scientific scope of the project will be met, regardless of what the IG declared a reduction in project scope.

Evidence: Program files, including Lehman reports. Predecisional Exhibit 300s submitted to OMB. Construction project data sheets in budget requests (www.mbe.doe.gov/budget/04budget/index.htm). NRC report, page 13 (www.nap.edu/catalog/10679.html).

PART Performance Measurements

Program: Basic Energy Sciences
Agency: Department of Energy
Bureau: Office of Science

Measure: Progress in designing, modeling, fabricating, characterizing, analyzing, assembling, and using a variety of new materials and structures, including metals, alloys, ceramics, polymers, biomaterials and more--particularly at the nanoscale--for energy-related applications. An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.

Additional Information: An external panel will conduct triennial reviews of progress. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2006	Excellent		
2009	Excellent		
2012	Excellent		
2015	Excellent		

Measure: Progress in understanding, modeling, and controlling chemical reactivity and energy transfer processes in the gas phase, in solutions, at interfaces, and on surfaces for energy-related applications, employing lessons from inorganic, organic, self-assembling, and biological systems. An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.

Additional Information: An external panel will conduct triennial reviews of progress. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2006	Excellent		
2009	Excellent		
2012	Excellent		
2015	Excellent		

PART Performance Measurements

Program: Basic Energy Sciences
Agency: Department of Energy
Bureau: Office of Science

Measure: Progress in developing new concepts and improving existing methods for solar energy conversion and other major energy research needs identified in the 2003 Basic Energy Sciences Advisory Committee workshop report, "Basic Research Needs to Assure a Secure Energy Future." An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.

Additional Information: An external panel will conduct triennial reviews of progress. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2006	Excellent		
2009	Excellent		
2012	Excellent		
2015	Met Goal		

Measure: Progress in conceiving, designing, fabricating, and using new instruments to characterize and ultimately control materials. An independent expert panel will conduct a review and rate progress (excellent, adequate, poor) on a triennial basis.

Additional Information: An external panel will conduct triennial reviews of progress. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Long-term
2006	Excellent		
2009	Excellent		
2012	Excellent		
2015	Met Goal		

Measure: Average achieved operation time of the scientific user facilities as a percentage of the total scheduled annual operation time. (Scheduled annual operating time is roughly 31,350 hours in 2004 and 35,450 hours in 2005. The ambitiousness and appropriateness of the 90% target level is currently under review by OMB.)

Additional Information: See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual (Efficiency Measure)
2001	>90%	96%	

PART Performance Measurements

Program: Basic Energy Sciences

Agency: Department of Energy

Bureau: Office of Science

Measure: Average achieved operation time of the scientific user facilities as a percentage of the total scheduled annual operation time. (Scheduled annual operating time is roughly 31,350 hours in 2004 and 35,450 hours in 2005. The ambitiousness and appropriateness of the 90% target level is currently under review by OMB.)

Additional Information: See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual	(Efficiency Measure)
2002	>90%	96%		
2003	>90%	91%		
2004	>90%			
2005	>90%			

Measure: Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.

Additional Information: Cost variance listed first. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual	(Efficiency Measure)
2001	<10%, <10%	+0.4%, -6.3%		
2002	<10%, <10%	-0.2%, -1.8%		
2003	<10%, <10%	-0.5%, -1.4%		
2004	<10%, <10%			
2005	<10%, <10%			

Measure: Improve Spatial Resolution: Demonstrated spatial resolutions for imaging in the hard and soft x-ray regions, and spatial information limit for an electron microscope (measured in nanometers).

Additional Information: See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2002		150, 24, 0.09	

PART Performance Measurements

Program: Basic Energy Sciences

Agency: Department of Energy

Bureau: Office of Science

Measure: Improve Spatial Resolution: Demonstrated spatial resolutions for imaging in the hard and soft x-ray regions, and spatial information limit for an electron microscope (measured in nanometers).

Additional Information: See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2003		130, 20, 0.09	
2004	<115,<19, <0.08		
2005	<100,<18, <0.08		

Measure: Improve temporal resolution: Demonstrated duration (measured in femtoseconds) and intensity (measured in millions photons per pulse) of an x-ray pulse.

Additional Information: The 2004 intensity target is at a greatly increased average brightness. See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2002		100, 0.0003	
2003		500, 1.0	
2004	<200, >0.005		
2005	<100, >100		

Measure: Number of reacting species and billions of grid points in a three-dimensional combustion reacting flow computer simulation, as a part of the Scientific Discovery through Advanced Computing effort.

Additional Information: See www.sc.doe.gov/measures for more information.

<u>Year</u>	<u>Target</u>	<u>Actual</u>	Measure Term: Annual
2002		8, 0.0005	
2003		8, 0.001	
2004	>44, >0.0005		

PART Performance Measurements

Program: Basic Energy Sciences

Agency: Department of Energy

Bureau: Office of Science

Measure: Number of reacting species and billions of grid points in a three-dimensional combustion reacting flow computer simulation, as a part of the Scientific Discovery through Advanced Computing effort.

Additional Information: See www.sc.doe.gov/measures for more information.

Year

2005

Target

>44, >7

Actual

Measure Term: Annual